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# Blood ethanol concentrations in patients attending special clinics in Glasgow

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The association between alcohol consumption and the acquisition of sexually-transmitted diseases is well documented. In Glasgow, it was found that over 90 per cent. of casual consorts who infected men with gonorrhoea were met within or outside bars or public houses (Wells and Schofield, 1970). Locally, as with the rest of Scotland, alcoholism is seen as a serious and increasingly disturbing problem (Macrae, Ratcliff, and Liddle, 1972), although no reliable statistics are yet available as to the drinking habits in different sectors of the community (Martin, 1973). In this paper, we report on the incidence and concentrations of ethanol in the blood of patients attending the Special Clinics in Glasgow.

## Material and methods

For a 4-week period, from March 11 to April 5, 1974, an extra 5 ml. of blood was taken from all patients having serological tests for syphilis, either at their initial visit or in the course of their surveillance. There were 543 men and 158 women. The date and time of collection, the patient's age, sex, marital status, occupation, the postal code of residence, and whether the patient was attending a clinic for the first time, was returning with a fresh infection, or was on surveillance were entered on a special form. Each specimen of clotted blood was stored at 4°C. until it was collected, usually on the following morning. The concentration of ethanol was measured by gas liquid chromatography as described by Curry, Walker, and Simpson (1966).

## Results

Ethanol was detected in 56 men (10·3 per cent.) and eight women (5·1 per cent. (Table I). Nine (1·6 per cent.) of the men and one (0·6 per cent.) of the women had blood ethanol concentrations in excess of 0·8 g./l.

There was no significant difference in the distribution of marital status, occupation, or the postal code of residence between those with or without detectable amounts of blood ethanol.

TABLE I *Distribution of blood ethanol concentrations by sex*

| *Blood ethanol concentration (g./l.)* | *Males* | | *Females* | | *Total* | |
|---|---|---|---|---|---|---|
| | *No.* | *Per cent.* | *No.* | *Per cent.* | *No.* | *Per cent.* |
| Zero | 487 | 89·7 | 150 | 94·9 | 637 | 90·9 |
| 0·01–0·1 | 19 | 3·5 | 5 | 3·2 | 24 | 3·4 |
| 0·11–0·2 | 13 | 2·5 | 0 | — | 13 | 1·9 |
| 0·21–0·4 | 10 | 1·8 | 0 | — | 10 | 1·4 |
| 0·41–0·8 | 5 | 0·9 | 2 | 1·3 | 7 | 1·0 |
| 0·81–1·5 | 5 | 0·9 | 1 | 0·6 | 6 | 0·8 |
| 1·51 and above | 4 | 0·7 | 0 | — | 4 | 0·6 |
| Total | 543 | 100·0 | 158 | 100·0 | 701 | 100·0 |

### AGE

*Men*

Ethanol was detected in male patients at all ages (Table II), the youngest being aged 18 and the oldest 60 years. The incidence was fairly constant for all age groups, between 10 and 11 per cent., except for teenagers among whom it was only 7·9 per cent.

*Women*

Ethanol was not detected in any female teenager, the youngest being aged 20 and the oldest 40 years. The incidence of ethanol detection rose from 4·9 per cent. of those aged 20 to 24 years to 9 per cent. of those aged 25 to 34 years and to 13 per cent. of those aged 35 and over.

### TIME OF DAY

The vast proportion of patients having detectable amounts of ethanol and all those with concentrations above 0·8 g./l. attended in the afternoons (Table III).

*Men*

Only seven (12 per cent.) attended during the morning sessions, when the highest blood concentration recorded was 0·22 g./l. The highest incidence (17·4 per cent.) was found in those attending between

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TABLE II *Blood ethanol concentrations by age and sex*

| *Blood ethanol concentration (g./l.)* | *Sex* | *Age group (yrs)* 15–19 | | 20–24 | | 25–34 | | 35 *and above* | | *Total* | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *No.* | *Per cent.* | *No.* | *Per cent.* | *No.* | *Per cent.* | *No.* | *Per cent.* | *No.* | *Per cent.* |
| Zero | M | 59 | 92.1 | 146 | 89·0 | 183 | 89·3 | 99 | 90·0 | 487 | 89·7 |
| | F | 48 | 100 | 58 | 95·1 | 31 | 91·0 | 13 | 87·0 | 150 | 94·9 |
| 0·01–0·1 | M | 1 | 1·6 | 7 | 4·3 | 6 | 2·9 | 5 | 4·6 | 19 | 3·5 |
| | F | 0 | — | 2 | 3·3 | 1 | 3·0 | 2 | 13·0 | 5 | 3·2 |
| 0·11–0·8 | M | 3 | 4·7 | 10 | 6·1 | 12 | 5·9 | 3 | 2·7 | 28 | 5·2 |
| | F | 0 | — | 1 | 1·6 | 1 | 3·0 | 0 | — | 2 | 1·3 |
| 0·81 and above | M | 1 | 1·6 | 1 | 0·6 | 4 | 1·9 | 3 | 2·7 | 9 | 1·6 |
| | F | 0 | — | 0 | — | 1 | 3·0 | 0 | — | 1 | 0·6 |
| Total with ethanol | M | 5 | 7·9 | 18 | 11·0 | 22 | 10·7 | 11 | 10·0 | 56 | 10·3 |
| | F | 0 | — | 3 | 4·9 | 3 | 9·0 | 2 | 13·0 | 8 | 5·1 |
| Total number screened | M | 64 | 100 | 164 | 100 | 205 | 100 | 110 | 100 | 543 | 100 |
| | F | 48 | 100 | 61 | 100 | 34 | 100 | 15 | 100 | 158 | 100 |

TABLE III *Blood ethanol concentrations by time of attendance and sex*

| *Blood ethanol concentration (g./l.)* | *Sex* | *Time of attendance* 9.30–11 *a.m.* | | 11–12 *a.m.* | | 12–2 *p.m.* | | 2–4 *p.m.* | | 4–6.30 *p.m.* | | *Total* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *No.* | *Per cent.* | *No.* | *Per cent.* | *No.* | *Per cent.* | *No.* | *Per cent.* | *No.* | *Per cent.* | *No.* | *Per cent.* |
| Zero | M | 104 | 95·4 | 82 | 97·6 | 39 | 95·2 | 123 | 82·6 | 139 | 86·9 | 487 | 89·7 |
| | F | 19 | 100 | 24 | 96·0 | 10 | 100 | 50 | 94·3 | 47 | 92·2 | 150 | 94·9 |
| 0·01–0·1 | M | 3 | 2·8 | 0 | — | 0 | — | 8 | 5·4 | 8 | 5·0 | 19 | 3·5 |
| | F | 0 | — | 1 | 4·0 | 0 | — | 1 | 1·9 | 3 | 5·9 | 5 | 3·2 |
| 0·11–0·8 | M | 2 | 1·8 | 2 | 2·4 | 1 | 2·4 | 14 | 9·3 | 9 | 5·6 | 28 | 5·2 |
| | F | 0 | — | 0 | — | 0 | — | 1 | 1·9 | 1 | 1·9 | 2 | 1·3 |
| 0·81 and above | M | 0 | — | 0 | — | 1 | 2·4 | 4 | 2·7 | 4 | 2·5 | 9 | 1·6 |
| | F | 0 | — | 0 | — | 0 | — | 1 | 1·9 | 0 | — | 1 | 0·6 |
| Total with ethanol | M | 5 | 4·6 | 2 | 2·4 | 2 | 4·8 | 26 | 17·4 | 21 | 13·1 | 56 | 10·3 |
| | F | 0 | — | 1 | 4·0 | 0 | — | 3 | 5·7 | 4 | 7·8 | 8 | 5·1 |
| Total number screened | M | 109 | 100 | 84 | 100 | 41 | 100 | 149 | 100 | 160 | 100 | 543 | 100 |
| | F | 19 | 100 | 25 | 100 | 10 | 100 | 53 | 100 | 51 | 100 | 158 | 100 |

2 and 4 p.m. but it dropped to 13·1 per cent. between 4 and 6.30 p.m.

*Women*

Ethanol was detected in only one female patient before 2 p.m. and then only at a concentration of 0·02 g./l. All three women with concentrations in excess of 0·1 g./l. were promiscuous. The highest incidence of positive findings (7·8 per cent.) was found among those attending between 4 and 6.30 p.m.

DAY OF THE WEEK

Ethanol was detected in a total of 64 patients, sixteen (25 per cent.) of whom attended on Tuesday afternoons, the local half-day closing for shops (Table IV). Of the eight with positive findings who attended in the mornings, five did so on Thursdays, the only day when there was a higher proportion of positive findings in the mornings (11·6 per cent.) than in the afternoon (7·8 per cent.). Of the ten with concentrations in excess of 0·8 g./l., five attended on Friday afternoons.

TYPE OF ATTENDANCE (Table V)

*Men*

The highest incidence of positive findings in male patients (11·6 per cent.) was among those making their first visit to a special clinic (Original New Patients). The incidence among those returning with fresh infections (Returned New Patients) was 9·3 per cent. and among those on surveillance 8·8 per cent. Ignoring those with blood ethanol concentrations below 0·11 g./l., the incidence among Original New Patients was 9·4 per cent. compared with 4·1 per cent. in the other two categories. Eight of the nine with concentrations in excess of 0·8 g./l. were Original New Patients, the ninth being a known alocholic.

*Women*

A different pattern was found among female patients, although the numbers were small. Ethanol was detected in the blood of 9 per cent. of those returning with fresh infections, in both cases in excess of

TABLE IV *Blood ethanol concentrations by day of attendance, and sex (Percentages in parentheses)*

| *Blood ethanol concentration (g./l.)* | *Sex* | *Day of the week* | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Monday* | | *Tuesday* | | *Wednesday* | | *Thursday* | | *Friday* | | *Saturday* | *Totals* | |
| | | *a.m.* | *p.m.* | *a.m.* | *p.m.* | *a.m.* | *p.m.* | *a.m.* | *p.m.* | *a.m.* | *p.m.* | *a.m.* | *a.m.* | *p.m.* |
| Zero | M | 46 (98) | 67 (89) | 30 (97) | 60 (82) | 36 (100) | 61 (85) | 29 (88) | 57 (89) | 25 (100) | 56 (85) | 20 (95) | 186 (96·4) | 301 (86·0) |
| | F | 10 (100) | 26 (96) | 10 (100) | 24 (89) | 4 (100) | 9 (100) | (90) | 38 (97) | 10 (100) | 10 (83) | — | 43 (98) | 107 (93·9) |
| 0·01–0·1 | M | 0 | 1 | 0 | 4 | 0 | 3 | 3 | 4 | 0 | 4 | 0 | 3 (1·5) | 16 (4·6) |
| | F | 0 | 1 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | — | 1 (2) | 4 (3·5) |
| 0·11–0·8 | M | 1 | 6 | 1 | 8 | 0 | 8 | 1 | 0 | 0 | 2 | 1 | 4 (2·1) | 24 (6·8) |
| | F | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | — | 0 | ? (1·7) |
| 0·81 and above | M | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 4 | 0 | 0 | 9 (2·6) |
| | F | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | — | 0 | 1 (0·9) |
| Total with ethanol | M | 1 (2) | 8 (11) | 1 (3) | 13 (18) | 0 | 11 (15) | 4 (12) | 7 (11) | 0 | 10 (15) | 1 (5) | 7 (3·6) | 49 (14·0) |
| | F | 0 | 1 (4) | 0 | 3 (11) | 0 | 0 | 1 (10) | 1 (3) | 0 | 2 (17) | — | 1 (2) | 7 (6·1) |
| Total number screened | M | 47 | 75 | 31 | 73 | 36 | 72 | 33 | 64 | 25 | 66 | 21 | 193 | 350 |
| | F | 10 | 27 | 10 | 27 | 4 | 9 | 10 | 39 | 10 | 12 | 0 | 44 | 114 |

TABLE V *Blood ethanol concentrations of patients attending as original or returned new patients or while on surveillance by sex*

| *Blood ethanol concentration (g./l.)* | *Sex* | *New patients* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | *Original* | | *Returned* | | *On surveillance* | | *Total* | |
| | | *No.* | *Per cent.* | *No.* | *Per cent.* | *No.* | *Per cent.* | *No.* | *Per cent.* |
| Zero | M | 244 | 88·4 | 88 | 90·7 | 155 | 91·2 | 487 | 89·7 |
| | F | 96 | 95·0 | 21 | 91·0 | 33 | 97·0 | 150 | 94·9 |
| 0·01–0·1 | M | 6 | 2·2 | 5 | 5·2 | 8 | 4·7 | 19 | 3·5 |
| | F | 4 | 4·0 | 0 | — | 1 | 3·0 | 5 | 3·2 |
| 0·11–0·8 | M | 18 | 6·5 | 4 | 4·1 | 6 | 3·5 | 28 | 5·2 |
| | F | 1 | 1·0 | 1 | 4·5 | 0 | — | 2 | 1·3 |
| 0·81 and above | M | 8 | 2·9 | 0 | — | 1 | 0·6 | 9 | 1·6 |
| | F | 0 | — | 1 | 4·5 | 0 | — | 1 | 0·6 |
| Total with ethanol | M | 32 | 11·6 | 9 | 9·3 | 15 | 8·8 | 56 | 10·3 |
| | F | 5 | 5·0 | 2 | 9·0 | 1 | 3·0 | 8 | 5·1 |
| Total number screened | M | 276 | 100 | 97 | 100 | 170 | 100 | 543 | 100 |
| | F | 101 | 100 | 23 | 100 | 34 | 100 | 158 | 100 |

0·1 g./l., compared with only 5 per cent. of those making an initial visit and 3 per cent. of those on surveillance.

A study was made of the clinic records of the nine men and one woman with blood ethanol concentrations in excess of 0·8 g./l. The only findings of note were that they nearly all defaulted early in their surveillance and few had a sexually-transmitted disease; two gonorrhoea, two non-specific urethritis, and four other conditions requiring treatment, and two did not require any treatment. Only one patient, the male alcoholic with an ethanol concentration of 3·13 g./l., completed surveillance, another attended four times, four attended twice, and four did not return after the initial visit.

## Discussion

Over 10 per cent. of male and 5 per cent. of female patients had been drinking before attending the clinics. All age groups of male patients were affected but especially those aged between 20 and 34 years as far as heavy drinking was concerned. Among the female patients, the problem seemed to increase with age, although the numbers were small.

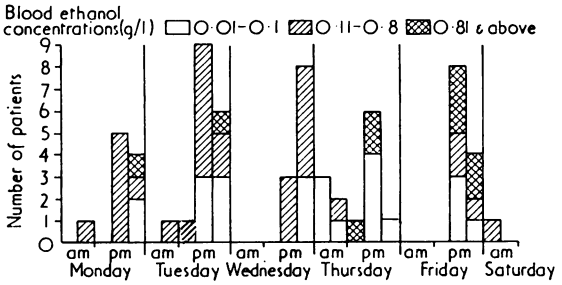
The association between heavy drinking and the acquisition of sexually-transmitted diseases has been reported from all parts of the world. Locally, it has been reported by Wells and Schofield (1970), in Sweden by Juhlin (1968), in the Royal Navy by Wheldon (1964), and among Australian troops by Hart (1973). Morton and Harris (1975) associated

the reported world-wide increase in the incidence of sexually-transmitted diseases with the increase in alcohol consumption noted in many parts of the world. It is understandable that those people will not alter their drinking habits merely because they may believe that they have acquired a sexually-transmitted disease or even after such a disease has been treated.

Nevertheless, as far as our patients are concerned, there are probably other psychological and sociological factors at play. The psychological stress on a non-promiscuous male in attending a clinic was discussed by Seale (1966) and 11·6 per cent. of our original new patients had been drinking before attending, 9·4 per cent. having blood ethanol concentrations in excess of 0·1 g./l. compared with only 4·1 per cent. of those returning with fresh infections or while on surveillance. Giard (1972) stressed the need to establish an immediate rapport with new patients and Mbanefo (1968) and Boneff (1971) emphasized the necessity of recognizing and dealing with the emotional as well as the clinical aspects of the infections. This is often difficult in busy clinics unless a social worker is available and certainly the patients with very high blood ethanol levels were not under treatment for long, most of them defaulting early in their surveillance, if not immediately. A different pattern of behaviour was apparent in the female patients. All three with blood ethanol concentrations in excess of 0·1 g./l. were promiscuous and would have been visiting bars as part of their trade.

The majority of patients (84 per cent.) with detectable amounts of ethanol in the blood attended after drinking at mid-day, so that the licensing laws may be partly responsible for the distribution that we have found. Locally the bars are open from 11 a.m. till 2.30 p.m. and from 5 p.m. till 10 p.m., Monday to Saturday. The Figure shows that during the week there were three peaks of high attendance of those who had been drinking. The main one occurred on Tuesday afternoons, when a quarter of all positive cases attended, and more attended between 2 and 4 p.m. than between 4 and 6.30 p.m. This is the local half-day in the shops but it appears that others also go drinking at mid-day, even if they are supposed to return to work later. The second and more sustained peak started on Wednesday afternoon and attained its maximum between 4 and 6.30 p.m., the only day when this exceeded the 2 to 4 p.m. figures. This can be correlated with attendances at football matches, associated locally with drinking before, during, and after the match. The final peak occurred on Friday afternoons when the heaviest drinking appeared to take place. This can probably be accounted for by the patients having received their wages on Friday morning.

FIGURE *Numbers of patients with various concentrations of blood ethanol by day and time of attendance*




A retrospective study of the clinic records of the ten patients with blood ethanol levels in excess of 0·8 g./l. did not reveal anything of note, except that only four of them had a sexually-transmitted disease and that the majority defaulted very early. Because of this, we could not obtain more information about their psycho-social backgrounds and, of greater importance, were not able to discuss their alcohol problem with them.

## Summary

Blood samples for measurement of ethanol concentration were taken on a routine basis from 543 male and 158 female patients attending Special Clinics in Glasgow. Ethanol was detected in 56 (10·3 per cent.) of the men and eight (5·1 per cent.) of the women, and at concentrations in excess of 0·1 g./l. in 37 (6·8 per cent.) and three (1·9 per cent.) respectively. In nine men and one woman, the blood ethanol concentration was over 0·8 g./l. when they attended the clinic.

The majority (84 per cent.) of positive findings were obtained in specimens collected after 2 p.m. and one-quarter on Tuesday afternoons, the local half-day. The other peak periods related to attendance at football matches on Wednesday evenings, and to receiving wages on Friday mornings.

Male new patients attending a clinic for the first time had the highest incidence, 32 (11·6 per cent.) having detectable amounts of ethanol among whom 26 (9·4 per cent.) had levels in excess of 0·1 g./l., compared with only 4·1 per cent. among those either returning to the clinics with a fresh infection or on surveillance. Only 5 per cent. of female patients attending for the first time and 3 per cent. of those on surveillance had detectable amounts of ethanol in the blood, compared with 9 per cent. of those few returning with fresh infections. Levels in excess of 0·1 g./l. were only found in promiscuous women.

Those with concentrations in excess of 0·8 g./l. were unreliable attenders. Only one, a known alcoholic, completed surveillance; one defaulted after his fourth visit, four after the second, and four after the first visit.

We wish to thank the nursing and clerical staffs in the clinics for taking the blood specimens and completing the proformas and the consultants for permission to include their patients in this survey. The work was supported by a grant from the Distillers' Company to the Alcohol Research Unit at the Western Infirmary, Glasgow.

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